

WHAT IS CLAIMED IS:

Sub A1 } 1. A method for making libraries of hybrid polynucleotide molecules in which double-stranded polynucleotide molecules are not used as starting materials.

2. The method of claim 1, wherein two types of single-stranded polynucleotide molecules are used as starting materials and wherein the first-type molecule comprises stretches of sequences containing one or more parts of homology and one or more parts of heterology to the complementary sequence of the second-type molecule.

3. The method of claim 2, wherein the single-stranded polynucleotide molecules are fragmented and used as templates for *de novo* polynucleotide synthesis to create hybrid polynucleotide molecules.

Sub A2 } 4. The method of claim 2, wherein mutations are introduced into hybrid polynucleotide molecules prior, during or after the production of the hybrid polynucleotide molecules.

5. A method for making libraries of hybrid polynucleotide molecules, which comprises:

(i) preparing two single-stranded polynucleotide molecules comprising sequences which are complementary to each other,

(ii) randomly or non-randomly fragmenting the two single-stranded polynucleotide molecules,

(iii) incubating the fragmented molecules under conditions such that hybridization of fragmented polynucleotide molecules occurs and *de novo* polynucleotide synthesis on the hybridized molecules occurs,

(iv) denaturing the resultant elongated double-stranded polynucleotide molecules into single-stranded polynucleotide molecules,

(v) incubating the resultant single-stranded polynucleotide molecules under conditions such that hybridization of single-stranded polynucleotide molecules occurs and *de novo* polynucleotide synthesis on the hybridized molecules occurs, and

(vi) repeating at least two further cycles of steps (iv) and (v).

Add A3